Industrial Standardization

and Commercial Standards Monthly

August

Use of ASA Symbol Is Protected
(See Article on Page 202)

1939

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In each case this mark means general agreement on the part of maker, seller, and user groups as to the best current practice in the industries or processes that the standard covers. In this work, the American Standards Association brings together manufacturers, distributors, consumers, technical specialists, and others directly concerned with a particular job; finds out whether there is wide enough interest in the work to make standardization on a national scale practical; provides for official representation of all the branches of industry or important governmental or consumer groups directly interested to work out the standard; and when substantial agreement has been reached by these groups so that the Association is definitely assured that the proposed standard represents a truly national consensus, the document is approved as an American Standard and bears this trade mark.

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RUTH E. MASON, *Editor*

This Issue

Our Front Cover: This Plaque of the ASA Symbol Represents the American Standards Association on the Mellon Institute Building

ASA

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Standardization is dynamic, not static. It means not to stand still, but to move forward together.

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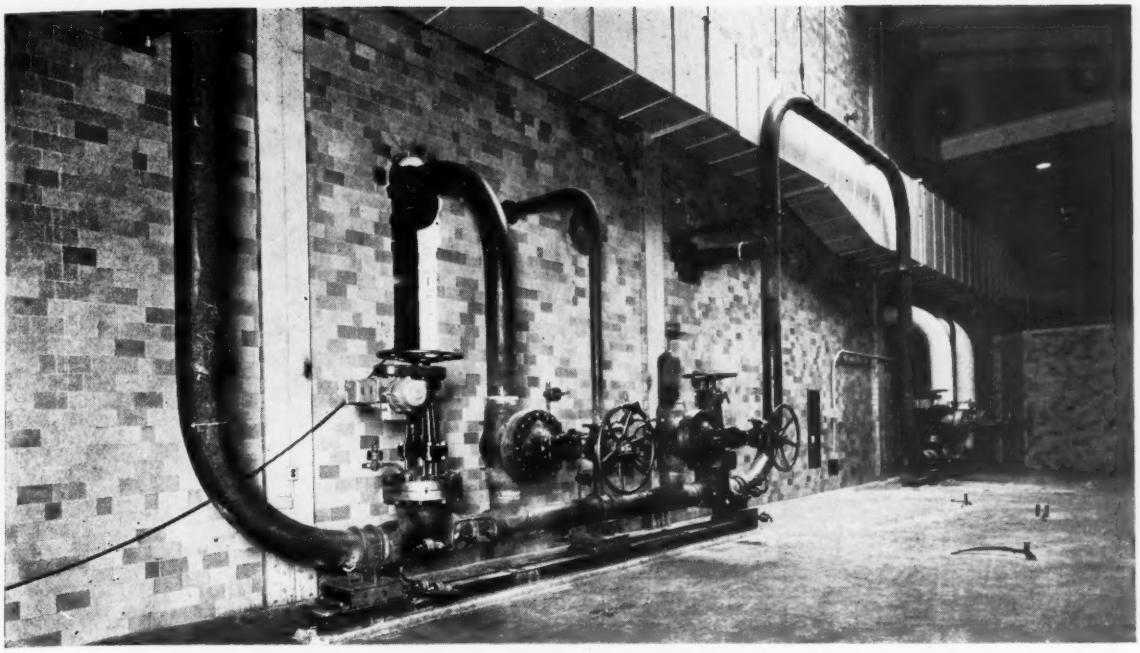

Schedule 100 carbon-molybdenum steel pipe in the main superheater steam header of the Delray Power Plant, Detroit Edison Company

Gradual Change-Over Seen as Method To Put Pipe Schedules Into Practice

by

H. H. Morgan,[1] Chairman
and
Sabin Crocker,[2] Secretary

ASA Committee on Standardization of Dimensions of Wrought-Iron and Wrought-Steel Pipe and Tubing (B36)

PRACTICAL advantages to both manufacturers and users of wrought-iron and wrought-steel pipe, demonstrated by the new schedules of pipe thicknesses and weights during the three years since they were approved as tentative standard by the American Standards Association, have now brought about their approval by the ASA as full American Standard. This should mean that provisions of the standard will be even more widely put into practice.

Use of the standard during these three years has shown that it provides a choice of diameters in a variety of wall thicknesses sufficient to permit users to specify standard rather than special thicknesses. When ordered in sufficient volume the standard thicknesses can be kept in stock by the jobber or manufacturer, where they are immediately available to the user. This eliminates

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the necessity of running a special order through the mill, saving extra expense for both the manufacturer and the user. The power industry, particularly, is fast becoming accustomed to ordering power piping according to the schedule number system set up by the standard, and is finding that it works admirably.

Work on the standard dimensions and thicknesses was started in 1927 because the three standard schedules then used, known as standard weight, extra strong, and double extra strong, were not sufficiently flexible. These standards followed the dimensions laid down in 1886 for "Standard Pipe and Pipe Threads" by a committee of the American Society of Mechanical Engineers, and were used for many years with little change. They were set up for pipe joined either directly with threaded ends and threaded couplings or fittings, or screwed flanges matching either a companion flange or the flange on the fitting. Because of the requirements for threading, these standards called for heavier wall thicknesses for given service conditions than are required for present-day lapped or welded joints where no metal is removed in cutting threads. No matter how low the working pressure might be, the so-called "standard weight" pipe called for walls sufficiently thick to permit cutting American Standard (or Briggs) taper pipe threads.

After 1920, steam pressures and temperatures started to climb above the 250 lb per sq in. (psi) gage and 600 F which had been tops for the preceding two decades, and the diversifications of new process work such as that in the oil and gas industries demanded a greater variety of wall thicknesses and diameters. The result was a tendency to order special thicknesses not included in the three weights comprising the 1886 standards, and to require sizes larger in diameter than were listed in those standards. Naturally each customer wished to buy wall thicknesses best suiting his particular service conditions irrespective of whether there was sufficient other demand for the article to justify it commercially.

This system encouraged the manufacturers to over-tool their plants in order to fill occasional large orders for non-standard pipe thicknesses, and the very multiplicity of these thicknesses made it impracticable to stock them for general sale. Hence, despite the great variety of thicknesses for whose manufacture mill equipment existed, small consumers of pipe often were unable to secure those thicknesses which would have been particularly economical for them to use. Moreover, although it may be economical to figure thicknesses closely and order special rollings from the mill for exceptionally large orders, such as for cross-country gas and oil lines, the average customer cannot brook the delay involved or pay for resetting the mill to run through a small order.

Problem Complicated

The problem was further complicated by the modern tendency to specify a wide variety of medium carbon and alloy steels in addition to the original product as made of wrought-iron or mild steel, and to call for new methods of manufacture such as seamless, or resistance or fusion-welded as well as the older furnace-welded pipe of the lap or butt-varieties. It became evident that it would be advantageous to at least restrict the choice of wall thicknesses to a reasonable number of standard schedules which would adequately cover the field, without trying to provide hair-line differences in thickness.

The American Standards Association in March, 1927, therefore, authorized the organization of a

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The American Standard for Wrought-Iron and Wrought-Steel Pipe (B36.10-1939), approved recently by the American Standards Association as American Standard, was issued as a tentative standard in 1935. In 1938, the sectional committee, representing 27 associations, technical societies, and government departments concerned with the manufacture or use of piping, recommended that the tentative standard be advanced to full American Standard, with a few minor changes.

The old system of standard weight, extra strong, and double-extra-strong pipe is so firmly entrenched with the trade that thus far it has seemed impracticable to set a definite date for a complete change-over to the new schedule numbers. In the meantime, the advantages of the new standard are being demonstrated to the trade with a view to gradually shifting the bulk of purchases from the old system to the new. The fact that most thicknesses of standard-weight and extra-strong pipe have been carried on in Schedules 40 and 80 as shown in Table 1 helps to make this gradual change-over practical.

It is hoped that those responsible for ordering pipe will specify what they want by diameter and schedule number, so that the economies inherent in full use of the standard may be realized.

Sectional Committee on Standardization of Dimensions and Material of Wrought-Iron and Wrought-Steel Pipe and Tubing, with the American Society of Mechanical Engineers and the American Society for Testing Materials acting as administrative leaders for the work of the committee.

Old Schedule Limited

The committee found that the limitations of the old standard-weight, extra strong, and double extra strong schedules were four-fold:

First, there was no provision for thin-walled pipe.

Second, there were no intervening standard thicknesses between the three old schedules, and these three schedules covered too great a spread to be economical without intermediate weights.

Third, there were no standardized dimensions for pipe in sizes larger than 12 in. diameter in standard weight and extra strong, nor 8 in. in double extra strong.

Fourth, since none of the old schedules would consistently fit any given set of service conditions throughout their size range, it usually was necessary in choosing pipe of different diameters for any given project to skip around between the three established schedules, or to order special thicknesses which the mills soon came to manufacture for the accommodation of their customers.

The standard as finally developed consists of ten weight and thickness schedules of which the lightest wall is Schedule 10 and the heaviest is Schedule 160, although Schedule 80 is the heaviest wall so far contemplated for wrought iron. Tabular wall thicknesses were worked out by a basic formula intended for this purpose only, and which should not be confused with design formulas such as those used in the ASME Boiler Code and the American Standard Code for Pressure Piping.

Tabular values of weights for corresponding sizes of steel and wrought-iron pipe are identical in sizes up to and including 12 in., although the nominal wall thicknesses for the two materials have been adjusted slightly to compensate for the small difference in specific weights. If the weights per foot of pipe of the two materials are

TABLE 1

Dimensions of Welded and Seamless Steel Pipe

Nominal Pipe Size	Outside Diam	Nominal Wall Thicknesses for Schedule Numbers									
		Sched 10	Sched 20	Sched 30	Sched 40	Sched 60	Sched 80	Sched 100	Sched 120	Sched 140	Sched 160
⅛	0.405	...	...	...	**0.068**	...	**0.095**	...	...	...	...
¼	0.540	...	...	...	**0.088**	...	**0.119**	...	...	...	...
⅜	0.675	...	...	...	**0.091**	...	**0.126**	...	...	...	...
½	0.840	...	...	...	**0.109**	...	**0.147**	...	...	...	0.187
¾	1.050	...	...	...	**0.113**	...	**0.154**	...	...	...	0.218
1	1.315	...	...	...	**0.133**	...	**0.179**	...	...	...	0.250
1¼	1.660	...	...	...	**0.140**	...	**0.191**	...	...	...	0.250
1½	1.900	...	...	...	**0.145**	...	**0.200**	...	...	...	0.281
2	2.375	...	...	...	**0.154**	...	**0.218**	...	...	...	0.343
2½	2.875	...	...	...	**0.203**	...	**0.276**	...	...	...	0.375
3	3.5	...	...	...	**0.216**	...	**0.300**	...	...	...	0.437
3½	4.0	...	...	...	**0.226**	...	**0.318**	...	...	...	...
4	4.5	...	...	...	**0.237**	...	**0.337**	...	0.437	...	0.531
5	5.563	...	...	...	**0.258**	...	**0.375**	...	0.500	...	0.625
6	6.625	...	...	...	**0.280**	...	**0.432**	...	0.562	...	0.718
8	8.625	...	0.250	**0.277**	**0.322**	0.406	**0.500**	0.593	0.718	0.812	0.906
10	10.75	...	0.250	**0.307**	**0.365**	**0.500**	0.593	0.718	0.843	1.000	1.125
12	12.75	...	0.250	**0.330**	0.406	0.562	0.687	0.843	1.000	1.125	1.312
14 O.D.	14.0	0.250	0.312	0.375	0.437	0.593	0.750	0.937	1.062	1.250	1.406
16 O.D.	16.0	0.250	0.312	0.375	0.500	0.656	0.843	1.031	1.218	1.437	1.562
18 O.D.	18.0	0.250	0.312	0.437	0.562	0.718	0.937	1.156	1.343	1.562	1.750
20 O.D.	20.0	0.250	0.375	0.500	0.593	0.812	1.031	1.250	1.500	1.750	1.937
24 O.D.	24.0	0.250	0.375	0.562	0.687	0.937	1.218	1.500	1.750	2.062	2.312
30 O.D.	30.0	0.312	0.500	0.625	...	...	...	...	...	...	...

All dimensions are given in inches.

Thicknesses shown in bold face type in Schedules 30 and 40 are identical with thicknesses for "standard weight" pipe in former lists; those in Schedules 60 and 80 are identical with thicknesses for "extra strong" pipe in former lists.

The Schedule Numbers indicate approximate values of the expression $1000 \times P/S$.

The decimal thicknesses listed for the respective pipe sizes represent their nominal or average wall dimensions. For tolerances on wall thicknesses, see appropriate material specification.

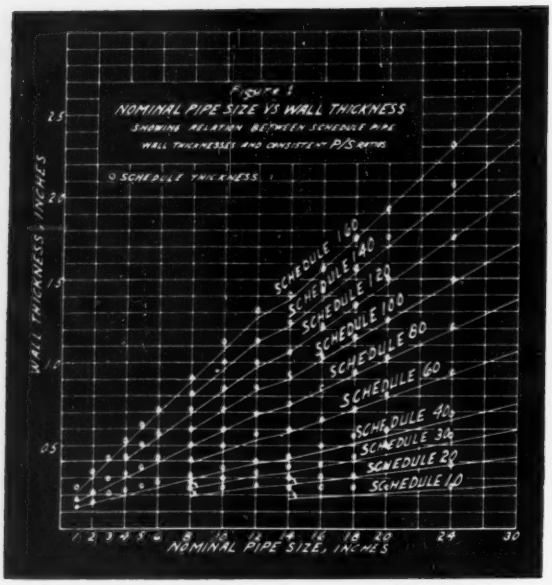

FIG. 1

given as the same, the wall thickness of wrought-iron pipe must necessarily exceed those for steel by about two per cent. In sizes 14 in. O.D. and larger where the thicknesses are the same, the necessary adjustment has been made in the weights.

Schedule numbers represent approximate values of the expression $1000\ P/S$, where P is pressure in lb per sq in. and S is the maximum bursting or hoop stress which the material is capable of sustaining with a reasonable factor of safety. For example, Schedule 40 seamless pipe of mild steel having an allowable working (bursting) stress of 10,000 lb per sq in. at around 700 F should be good for just about 400 lb steam pressure at that temperature, as demonstrated by:

$$\text{Schedule Number} = (1000 \times 400) \div 10{,}000 = 40$$

In the same Schedule 40 wall thicknesses, other materials and steam temperatures would, of course, have different allowable bursting stresses and hence be good for different working pressures. The foregoing relation does, however, give an approximate rule-of-thumb for visualizing the physical significance of the schedule numbers in easily understood terms. In a very rough way the allowable working pressure often comes out about ten times the schedule number except where creep is a predominant factor. This is because of the fact that at temperatures up to 750 F, the allowable stress for carbon steels averages about 10,000 lb per sq in. On the other hand, provision for new materials and more severe service conditions than contemplated, even at present, are provided for in that the thicknesses are not tied to particular pressure-temperature conditions or materials as was the case with the old series of thicknesses first published in connection with ASTM Specification A106-26T.

Presentation of the basic formula itself is purposely omitted here since it already has served its purpose.

It was intended merely for use in computing a rational set of thickness schedules, each of which would come somewhere near fitting a given set of service conditions throughout the full range of pipe diameters embraced in the schedule. After theoretical thicknesses were computed by formula, corresponding tabular thicknesses were selected from available commercial thicknesses, taking in each case the commercial thickness next greater than the theoretical.

Computation of Wall Thickness for Given Service Conditions

Designers wishing to compute the proper thickness of pipe for a given service application should use the design formulas provided in the American Standard Code for Pressure Piping or the ASME Boiler Construction Code, as the case may be. These formulas give the minimum pipe wall thickness required on inspection. It is trade practice, however, to furnish pipe to nominal or average wall thicknesses with a plus and minus tolerance to look after variations in manufacture. In ordering pipe, therefore, a nominal wall should be selected from the B36.10 tables which, after deducting for mill tolerance as defined in the specification under which the pipe is bought, is just sufficient to afford the minimum thickness on inspection as computed by the design formula. Procurement of pipe will be facilitated through buying under a standard specification covering properties of material and including manufacturing tolerances.

Fortunately, the old standard-weight and extra-strong thicknesses coincided rather closely with the new Schedules 40 and 80 respectively as shown in Table 1 where thicknesses common to both systems are set in bold face type. This constitutes a definite advantage, since the use of these old weights is so firmly intrenched in the plumbing and heating trade that any plan which did not embrace them, at least through a transition period, would not be generally acceptable. The fact that a few old thicknesses are split between adjoining columns arises from the lack of consistent progression of thickness with increasing pipe size under the old system, as well as to the fact that previous to 1927 there were alternate thicknesses of standard weight pipe in the 8, 10 and 12 in. sizes. Besides being thicker than Schedule 160 pipe, which is the heaviest now contemplated

in the standard, the old double-extra-strong schedule was so erratic as to have no place in the new system and accordingly its thicknesses were dropped from consideration.

Examination of Table 1 shows that whereas all schedules cover the large sizes up to 24 or 30 in. diameter, only Schedules 40, 80, 120 and 160 extend below the 8 in. size, and of these only 40, 80, and 160 have sizes below 4 in. That there is good reason for this is apparent from Fig. 1 where the schedules are portrayed graphically in fan-shaped formation diverging from an origin of small diameter and light wall thickness. The close proximity of the lines representing Schedules 40, 80, 120 and 160 from near the origin out to sizes of the order of 4 to 8 in. diameter demonstrates the reason for omitting the very small differences in thickness involved.

Pipe conforming to B36.10 standard dimensions can be bought to a wide variety of specifications as listed for information in that standard. Among the products which it is expected will be furnished to these dimensions are seamless pipe, furnace welded pipe of the lap and butt varieties, resistance welded, forge welded, fusion welded, spiral riveted or welded, and lock bar. Different grades of material are contemplated as well as different finishes such as hot or cold drawn, black or galvanized or other protective coating. These specifications are sponsored by various bodies, such as the American Society for Testing Materials and the American Petroleum Institute. Specifications listed in the reference table of B36.10 have been reviewed by Sectional Committee B36 and accepted as suitable for use in purchasing the products which they cover. Those ASTM specifications which have the status of a full standard have been adopted also as American Standards and given ASA serial numbers by the American Standards Association.

Eleven Approved Standards Now In Iron and Steel Pipe Project

The project for Standardization of Dimensions and Materials of Wrought-Iron and Wrought-Steel Pipe and Tubing, of which the American Standard for Wrought-Iron and Wrought-Steel Pipe (B36.10-1939) is one part, is continually being broadened and made more complete. The latest action of the American Standards Association on this project was a minor revision in Specifications for Welded Wrought-Iron Pipe (now B36.2-1939) and approval as American Standard of the ASTM Standard Specifications for Electric-Fusion-Welded Steel Pipe for High-Temperature and High-Pressure Service (ASA B36.11-1939; ASTM A 155-36).

Two other ASTM tentative standards have now been recommended to the sectional committee for action to bring them before the ASA for approval as soon as they are adopted by the ASTM. These are Tentative Standards for Seamless Alloy-Steel Pipe for Service at Temperatures from 750 to 1100 F (ASTM A 158) and for Seamless Carbon-Molybdenum Alloy-Steel Pipe for Service at Temperatures from 750 to 1000 F (ASTM A 206).

The standards approved by the American Standards Association under project B36 are:

- Specifications for Welded and Seamless Steel Pipe (B36.1-1936; ASTM A 53-36)
- Specifications for Welded Wrought-Iron Pipe (B36.2-1939; ASTM A 72-33)
- Specifications for Lap-Welded and Seamless Steel Pipe for High-Temperature Service (B36.3-1936; ASTM A 106-36)
- Specifications for Electric-Fusion-Welded Steel Pipe (Sizes 30 in. and Over) (B36.4-1936; ASTM A 134-36)
- Specifications for Electric-Resistance-Welded Steel Pipe (B36.5-1935; ASTM A 135-34)
- Specifications for Forge-Welded Steel Pipe (B36.6-1935; ASTM A 136-34)
- Specifications for Lock-Bar Steel Pipe (B36.7-1935; ASTM A 137-34)
- Specifications for Riveted Steel and Wrought-Iron Pipe (B36.8-1935; ASTM A 138-34)
- Specifications for Electric-Fusion-Welded Steel Pipe (Sizes 8 in. to but not including 30 in.) (B36.9-1936; ASTM A 139-36)
- Wrought-Iron and Wrought-Steel Pipe (B36.10-1939)
- Specifications for Electric-Fusion-Welded Steel Pipe for High-Temperature and High-Pressure Service (B36.11-1939; ASTM A 155-36)

The work of this ASA project is carried on under the leadership of the American Society of Mechanical Engineers and the American Society for Testing Materials.

ASA Registers Symbol ASA To Protect Its Use

Application by the American Standards Association for protection of its name and symbol has now been approved by the United States Patent Office. This action marks the successful completion of preliminary steps toward protecting the designation of standards as approved by the American Standards Association

RECENT approval by the United States Patent Office of applications for protection of the Association name and symbol marks the successful completion of preliminary steps toward protection of the designation of standards approved by the American Standards Association.

The measures thus far taken include the following:

The name of the Association has been recorded to prevent others registering that name as a trade-mark;

The ASA symbol has been filed as evidence of prior use of the symbol; and

The symbol has been registered as a collective trade-mark, which establishes the right of the ASA to its exclusive use in connection with publications relating to standards.

Amendments last year to the existing trade-mark laws have made this step possible. Previous to that time trade associations, national organizations, societies, and similar groups were prohibited from registering their symbols or marks because of the requirement that the trade-mark must indicate the personal origin of the goods with which it was associated. Under the present laws, however, an organization such as the ASA, which exercises legitimate control over the use of a collective mark, now qualifies as an owner entitled to Federal registration of the mark, even though the mark is not used in such manner as to indicate origin of the goods in the association itself.

The ASA symbol was adopted in 1930 and has been continually used since that time on the Year Book, the magazine, printed standards, and other literature. Through association with this material it has come to be generally recognized as the trade-mark of the ASA and as a result of this usage would probably be accepted under the common law as the property of the ASA. Registration of the mark, on the other hand, not only establishes prima facie evidence of ownership but also gives to the ASA the benefits of the trade-mark statutes.

The measures thus far taken afford a considerable degree of protection but do not accomplish the whole objective, which is to surround the term "American Standard" with safeguards to prevent its use by others in such a manner as to suggest that an article or device has been approved by the ASA as an American Standard. In a few instances it has been possible to prevent this misuse through the cooperation of the user, but it is believed advisable to obtain the protection of the trade-mark laws rather than to depend on this cooperation. Some difficulties stand in the way of accomplishing this purpose. It is expected, however, that a method will ultimately be worked out to protect the designation of national standards so that such designations will be used only to identify materials conforming to these standards.

Our Front Cover

The ASA symbol, in the medallion shown on our front cover, forms part of the decorative motif in the lobby and vestibule of the Mellon Institute Building, Pittsburgh. The medallions which decorate the building represent the emblems of leading scientific organizations in this country which have a relationship with the Institute's work.

Many Draft Standards Near Completion, ASA Mechanical Committees Report

SEVERAL important research projects, a great deal of activity in connection with the revision of standards previously approved, and draft standards nearing completion were reported as outstanding activities of the committees under the jurisdiction of the Mechanical Standards Committee at the annual meeting of the Committee in April.

Research work on screw thread practice and on dimensions of furnaces for solid fuel is expected to result in information that will make it possible to revise the 1935 standard on screw threads and to prepare a standard on dimensions of furnaces. New standards on which drafts are nearing completion include such important subjects as Speeds of Machinery; Classification and Designation of Surface Qualities; Engineering and Scientific Graphs for Publications; Reamers; and Designations and Working Ranges of Surface Grinders. Draft revisions are nearing completion on Tool Holder Shanks and Tool Post Openings; Jig Bushings; Circular and Dovetail Forming Tool Blanks; Taps; and Pipe and Pipe Fittings.

American Standards in the mechanical field approved during the past year cover Pressure and Vacuum Gages; Terminology and Definitions for Single-Point Cutting Tools; and several pipe standards.

The activities of the mechanical projects for which reports are available are summarized below. The names of the organizations which have the administrative responsibility for the work are given in each case.

Identification of Piping Systems (A13)—Industry has apparently found the present American Standard for the Identification of Piping Systems (A13-1928) satisfactory and the committee has therefore found no reason to revise it.—*American Society of Mechanical Engineers; National Safety Council.*

Screw Threads (B1) — Several proposed changes in the American Standard for Screw Threads for Bolts, Nuts, Machine Screws and Threaded Parts were recommended at a meeting of the committee December 7, 1938. Plans for the revision of the standard were carried forward another step at the committee's meeting in April, 1939, when a subcommittee was appointed to supervise a series of tests to be carried out at the Massachusetts Institute of Technology. The tests will be made to determine what influence errors, elasticity, and plasticity may have on the strength of screw threads.—*American Society of Mechanical Engineers; Society of Automotive Engineers.*

Pipe Threads (B2)—Work on the revision and expansion of the American Standard for Pipe Threads (B2-1919) has been carried forward since January 1, 1938, by two special editing committees. During the year, there have been two important developments—(1). A long series of tests on pipe threads for line pipe and other service was completed by the American Petroleum Institute in cooperation with the pipe manufacturing industry. (2). A revision of the thread dimensions and characteristics desired as standard was made by the rigid conduit industry. These developments and their effect on the American Standard for Pipe Threads were discussed at a meeting of the committee in April.—*American Gas Association; American Society of Mechanical Engineers.*

Ball and Roller Bearings (B3)—Revised tables, including a new extra-light series of single-row radial bearings, have been approved as a proposed revision of the present standard by the Society of Automotive Engineers and have been submitted to the ASME as co-sponsor. When the ASME has approved them, they will be submitted through the ASA to committee 4 of the International Standards Association for review and acceptance.—*Society of Automotive Engineers; American Society of Mechanical Engineers.*

Allowances and Tolerances for Limit Gages (B4)—This committee has decided to

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Sixteen technical committees are working on standards for machine tools and machine tool elements under the general committee sponsored by the American Society of Mechanical Engineers, the National Machine Tool Builders Association, and the Society of Automotive Engineers. The status of the work they are doing is shown on the next page.

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base its revision of the American Standard for Tolerances, Allowances, and Gages for Metal Fits (B4a-1925) on the report of ISA Committee 3 on Fits. This will involve making an English translation of the International Standards Association report and an inch conversion of the ISA tables. The committee will go ahead with this work after it has received a copy of the final report of ISA Committee 3.—*American Society of Mechanical Engineers.*

Small Tools and Machine Tool Elements (B5)—The status of the work of the technical committees of this project is reported as follows:

Technical Committee 1 on T-Slots—The American Standard for T-Slots, their Bolts, Nuts, Tongues and Cutters (B5a-1927) is still in use and is not being revised.

Technical Committee 2 on Tool Posts and Tool Shanks—A draft revision of the American Standard for Tool Holder Shanks and Tool Post Openings (B5b-1929) was completed in July, 1938. Copies have been widely distributed to industry for comment and criticism.

Technical Committee 3 on Machine Tapers—This committee met in December with Technical Committee 4 to consider revising the American Standard for Machine Tapers (Self-Holding) (B5.10-1937), particularly with regard to certain features affecting the work on Drilling Machines and Horizontal Boring Machines being carried on in a subgroup of technical committee 4. Detailed data will be prepared before the recommended changes will be considered further.

Technical Committee 4 on Spindle Noses and Collets—A revision of the American Standard for Machine Tapers is being studied with Technical Committee 3. No revision of the American Standard for Lathe Spindle Noses (B5.9-1936) is being considered.

Technical Committee 5 on Milling Cutters—No suggestions for changes in the American Standard for Milling Cutters (B5c-1930) have been received.

Technical Committee 6 on Designations and Working Ranges of Machine Tools—A draft of a proposed American Standard for Designations and Working Ranges of Surface Grinders of the Reciprocating Table Type, based on the standard developed by the Surface Grinders' Group of the National Machine Tool Builders Association, was considered by this committee in December.

Technical Committee 7 on Twist Drill Sizes—Early in 1938, Technical Committee 7 presented the proposed American Standard for Twist Drills to the American Standards Association for final approval. It was considered by a special ASA committee at a meeting in March, 1938. Since the Metal Cutting Tool Institute had objected to the proposal, a meeting of the Drill and Reamer Division of the Metal Cutting Tool Institute and a special committee on Table Drills of the ASA was held in New York, September 14, 1938. As a result of this meeting and some further discussions and correspondence it now appears that the drill manufacturers are willing to give their approval to the proposed standard. The ASA Special Committee is now awaiting definite word to this effect.

Technical Committee 8 on Jig Bushings—A draft revision of the American Standard for Jig Bushings (B5.6-1935) is being completed and copies will be distributed to industry for criticism and comment.

Technical Committee 9 on Punch Press Tools—The committee has decided to include terminology and definitions of punch and die sets in its proposed American Standard for Punch and Die Sets, and is now working on this material.

Technical Committee 10 on Forming Tools and Holders—A draft of a revision of the American Standard for Circular and Dovetail Forming Tool Blanks (B5.7-1936), combining the present standard and a proposal on holders, is now being revised to include recommended changes.

A revised draft of the proposed American Standard for Straight Blade Cut-Off Tools will be prepared as soon as data has been received from leading manufacturers. Copies will be distributed to industry for criticism and comment.

Technical Committee 11 on Chucks and Chuck Jaws—No revision is being considered.

Technical Committee 12 on Cut and Ground Thread Taps—A revision of the American Standard for Taps (B5e-1930) is now being voted upon by the technical committee.

Technical Committee 13 on Splines and Splined Shafts—A revised draft of the proposed American Standard for Involuted Splines is now being voted upon.

Technical Committee 18 on Adjustable Adapters for Multiple Spindle Drilling Heads—No revision of the American Standard (B5.11-1937) is being considered.

Technical Committee 19 on Single Point Cutting Tools—The American Standard Terminology and Definitions for Single-Point Cutting Tools (B5.13-1939) was approved by the ASA in January, 1939, after more than four years of work by the committee.

Technical Committee 20 on Reamers—A draft of a proposed American Standard for Reamers is being sent to industry for criticism and comment. —*American Society of Mechanical Engineers; National Machine Tool Builders' Association; Society of Automotive Engineers.*

Gears (B6)—Three standards presented to this committee by the American Gear Manufacturers Association have been considered by special subcommittees. Comments of the special subcom-

mittee on the Recommended Practice for Nonmetallic Gearing have been referred to the AGMA committee.

The AGMA Standard for Backlash for Industrial Spur Gears was approved by the special subcommittee and will be distributed for comment and criticism.

Comments of the special subcommittee on the AGMA Standard Practice for Keyways in Gears are being considered by the AGMA committee.

A meeting was held in May to review the recommendations made by the ASME Standardization Committee on the proposed American Standard for Gearing Nomenclature. The AGMA as one of the sponsors approved the proposed standard in October, 1937, but the ASME, the other sponsor, was unwilling to complete its approval until certain changes were made in the proposal. —*American Gear Manufacturers Association; American Society of Mechanical Engineers.*

Pipe Flanges and Fittings (B16)—

Subcommittee 1, Cast Iron Flanges and Flanged Fittings—A revision of the Standard for Class 125 Cast-Iron Pipe Flanges and Flanged Fittings was approved by the ASA in February, 1939.

Subcommittee 2, Screwed Fittings—A 1939 revision of American Standard for Malleable Iron Screwed Fittings, 150 lb, has been approved by the American Standards Association.

Subcommittee 3, Steel Flanges and Flanged Fittings—The revision of the American Standard for Steel Pipe Flanges and Flanged Fittings has now been completed and approved (B16e-1939). The standard is a greatly enlarged revision of the standard approved by the ASA in 1927 and revised in 1932.

Subgroup 6 of Subcommittee 3, Welding Fittings—This subgroup has prepared the first printed draft of a proposed American Standard on Welding Fittings, and the draft is now being circulated among interested manufacturers and users, before being presented to subcommittee 3.

A sub-subgroup of Subgroup 6 was organized in December, 1938, to develop a proposed American Standard on Socket Welding Fittings.

Subcommittee 4, Materials and Stresses—A. M. Houser, chairman of this subcommittee, has cooperated actively with subcommittee 3 in developing the revised standard on Steel Flanges and Fittings.

Subcommittee 5, Face-to-Face Dimensions of Ferrous Flanged Valves—The new standard developed by this subcommittee was approved by the American Standards Association in February, 1939.—*Manufacturers Standardization Society of the Valve and Fittings Industry; American Society of Mechanical Engineers; Heating, Piping and Air Conditioning Contractors National Association.*

Shafting (B17)—No revision of the American Standard for Shafting and Stock Keys (B17.1-1934) is being considered.—*American Society of Mechanical Engineers.*

Bolt, Nut and Rivet Proportions (B18)—The editing committee is expected soon to complete its work on the proposed revision of the American Standard for Wrench-Head Bolts and Nuts and Wrench Openings (B18.2-1933). The committee is now considering changes suggested in the proposed revision of the American Standard for Round Unslotted Head Bolts.—*American Society of Mechanical Engineers; Society of Automotive Engineers.*

Fire-Hose Coupling Screw Thread (B26-1925)—No revision is under consideration on this standard.—*National Board of Fire Underwriters; American Society of Mechanical Engineers; American Water Works Association.*

Activity on piping standards was reported by the two ASA committees on piping—Pipe Flanges and Fittings (B16) and Wrought-Iron and Wrought-Steel Pipe (B36). Three revisions and one new standard were approved by the American Standards Association during the past year as the result of the work of the ASA Committee on Pipe Flanges and Fittings. They are:

New

American Standard for Face-to-Face Dimensions of Ferrous Flanged Valves (B16.10-1939)

Revised

American Standard for Class 125 Cast-Iron Pipe Flanges and Flanged Fittings (B16.1-1939)
American Standard for Malleable Iron Screwed Fittings, 150 Lb (B16)
American Standard for Steel Pipe Flanges and Flanged Fittings (B16e-1939)

The report of this committee also shows the completion of the first printed draft of a new standard on welding fittings.

One new standard and two revisions were completed by the committee on Wrought-Iron and Wrought-Steel Pipe and Tubing (B36). They are:

New

American Standard Specifications for Electric Fusion-Welded Steel Pipe for High-Temperature and High-Pressure Service (B36.11-1939)

Revised

American Standard Specifications for Welded Wrought-Iron Pipe (B36.2-1939)
American Standard for Wrought-Iron and Wrought-Steel Pipe (B36.10-1939)

The Committee on Pressure Piping also reports progress toward a revision of the American Standard Code for Pressure Piping (B31-1935).

Plain and Lock Washers (B27)—

Plain Washers—The first tentative draft of a proposed American Standard for Plain Washers was distributed in May, 1935, for criticism and comment. The results were included in a draft dated May, 1936. A vote of the sectional committee on this draft indicated that all the manufacturers opposed the standard in its present form. The results of this ballot were communicated to the two sponsor bodies, the SAE and the ASME, in March, 1937. A conference of representatives of the sponsors was held May 20, 1937. The opinion of those present was that the proposed standard had been well worked out and, except for some minor changes and additions, it had their approval. Certain members of the conference agreed to make some inquiries concerning the possibility of securing an agreement.

Lock Washers—In September, 1931, the Subcommittee on Lock Washers completed a draft of a proposed American Standard for Lock Washers, which was distributed for criticism and comment. The replies were reviewed by the committee in April, 1932. It appeared that the automotive industry wanted some additional sizes and was opposed to an increase of the sectional area and the weight of spring lock washers desired by the manufacturers. During the past six years the manufacturers have been at work on a revised proposal which is expected to come before the committee some time this year.—*American Society of Mechanical Engineers; Society of Automotive Engineers.*

Roller Chains and Sprockets (B29)—The American Standard for Roller Chains, Sprockets and Cutters (B29a-1930) is now being reviewed by the Association of Roller and Silent Chain Manufacturers who will recommend revisions for the committee's consideration. There is a possibility that the committee should be reorganized.

A proposed standard for roller chain speeds was rejected by the committee and the Association of Chain Manufacturers is now working on an alternate proposal.

A proposed standard for chain and sprocket nomenclature has been approved by the committee and sent to the sponsors for final action.—*American Gear Manufacturers Association; American Society of Mechanical Engineers; the Society of Automotive Engineers.*

Pressure Piping (B31)—At a meeting of the committee in December, 1937, it was unanimously decided that progress in the field made since 1935 when the American Standard Code for Pressure Piping (B31-1935) was published, had been such that a revision should be made. The subcommittees were reorganized and reports of progress have already been received from many of them.—*American Society of Mechanical Engineers.*

Wire and Sheet Metal Gages (B32)—This project has been inactive for some time, but at the meeting of the ASA Mechanical Standards Committee in April, the recommendations were made for active steps to revivify the work. These recommendations are now being followed.—*American Society of Mechanical Engineers; Society of Automotive Engineers.*

Hose Coupling Screw Threads (B33)—No revision of the American Standard for Hose Coupling Screw Threads (B33.1-1935) is under consideration.—*American Society of Mechanical Engineers.*

Wrought-Iron and Wrought-Steel Pipe and Tubing (B36)—Revisions of the 1934 edition of Specifications for Welded Wrought-Iron Pipe (B36.2-1934), and the 1935 edition of Wrought-Iron and Wrought-Steel Pipe (B36.10-1935) were finally approved by the ASA in April, 1939. The ASA also approved as a new American Standard Specifications for Electric Fusion-Welded Steel Pipe for High-Temperature and High-Pressure Service (B36.11-1939).—*American Society of Mechanical Engineers; American Society for Testing Materials.*

Pressure and Vacuum Gages (B40)—The American Standard for Indicating Pressure and Vacuum Gages (B40.1-1939) was submitted to the American Standards Association in March, 1939, and was approved July 10.—*American Society of Mechanical Engineers.*

Stock Sizes and Lengths for Iron and Steel Bars (B41)—Three subcommittees have been organized to develop the data on present practice on the three types of bars: (1) hot rolled steel; (2) cold rolled steel; and (3) hot rolled wrought-iron bars. The data for the first two of these types of bars are now in the hands of the staff of the sponsor body. They will be worked into a proposed American Standard as soon as circumstances permit.—*American Society of Mechanical Engineers.*

Leather Belting (B42)—The Engineering Committee of the American Belting Association has completed a revision of the association's Specification for Vegetable-Tanned Flat Leather Belting and tables giving the Horsepower Ratings for Oak Tanned Flat Leather Belting. The Association is represented on the ASA committee B42 and the ASME, sponsor for the committee, has kept itself informed concerning progress on these undertakings. A revised draft of the specifications is now being prepared as a proposed American Standard.—*American Society of Mechanical Engineers.*

Machine Pins (B43)—A deadlock has occurred between the producer and consumer interests. This project was originally proposed by the users who desired that taper machine pins of various lengths be standardized with the diameter

at the small end as the basis. This would more readily permit the fitting of the taper machine pin to its tapered hole. The present practice in this country, however, is to list taper pin sizes on the basis of the diameter at the large end. The draft standard now before the committee reflects the user point of view and is objected to by the producers. The sponsor society plans to make one further attempt to reconcile these two opposite points of view. If it is unsuccessful, a recommendation for the abandonment of the project will be made to the ASA.—*American Society of Mechanical Engineers; Society of Automotive Engineers.*

Foundry Equipment and Supplies (B45)—The first proposal of this committee was based on a system of colors for foundry patterns devised by a committee of the American Foundrymen's Association, which became an American Recommended Practice in 1932. Since no other proposal for standardization seemed to be in sight, the ASME early last year recommended to the American Foundrymen's Association, co-sponsor, that the project be dissolved. The AFA and the chairman of the committee, however, favored its continuation for a while longer.—*American Society of Mechanical Engineers; American Foundrymen's Association.*

Surface Qualities (B46)—A draft standard on Classification and Designation of Surface Qualities is now before the committee. This draft was compiled following distribution to a selected list of interested firms and individuals in industry for review and comment.—*American Society of Mechanical Engineers; Society of Automotive Engineers.*

Gage Blanks (B47-1933)—A revision of this American Standard has been under consideration for some time and is expected to come up before the ASA in the near future.

Inch-Millimeter Conversion for Industrial Use (B48.1-1933)—No revision of this standard is being considered.

Shaft Couplings, Integrally Forged Flange Type for Hydro-Electric Units (B49-1932)—No revision of this standard is being considered.

Unification of Rules for the Dimensioning of Furnaces for Burning Solid Fuel (B50)—It was decided by the committee, following numerous conferences and meetings of the officers and small groups interested, that factual data necessary to establish standard combustion space and setting heights for boilers and furnaces in which underfeed stokers are installed should be obtained. A special steering committee has been appointed to supervise the field survey and the following five groups have agreed to sponsor the investigation: Stoker Manufacturers Association, the bituminous coal interests, the Institute of Boiler and Radiator Manufacturers, the Steel Heating Boiler Institute, and the Smoke Prevention Association.

The field survey is to cover not less than 100 installations including the various types and sizes of boilers and four types of coal. Data forms

ASA Mechanical Standards Committee

The Mechanical Standards Committee, which supervises the work on mechanical standards of the American Standards Association, brings together the following organizations especially concerned with the projects in this field. Officers and members of this committee are:

Alfred Iddles*, American Society of Mechanical Engineers, *Chairman

F. H. Morehead*, Manufacturers Standardization Society of the Valve and Fittings Industry, *Vice-Chairman

American Foundrymen's Association, *LeRoy M. Sherwin*
American Gear Manufacturers Association, *T. R. Rideout*
American Institute of Bolt, Nut and Rivet Manufacturers, *John S. Davey*
American Iron and Steel Institute, *Charles M. Parker*
American Society of Mechanical Engineers, *Alfred Iddles, Walter Samans (alt.)*
American Society for Testing Materials, *H. H. Morgan, R. E. Hess (alt.)*
American Transit Association, *Frank T. Ward, Frank E. Seeney (alt.)*
ASA Electric Light and Power Group, *Edwin B. Ricketts, Alexander Maxwell (alt.)*
ASA Telephone Group, *Stanley Bracken, A. O. Avery (alt.)*
Association of American Railroads, *J. E. Ennis, K. Cartwright (alt.)*
Grinding Wheel Manufacturers Assn., *A. Rousseau*
Heating, Piping and Air Conditioning Contractors National Assn., *H. M. Hart*
Manufacturers Standardization Society of the Valve and Fittings Industry, *F. H. Morehead, A. M. Houser (alt.)*
National Bureau of Standards, *I. J. Fairchild, H. L. Whittemore (alt.)*
National Electrical Manufacturers Association, *Frank Thornton, L. F. Adams (alt.)*
National Machine Tool Builders Association, *F. O. Hoagland*
Society of Automotive Engineers, *F. K. Glynn, A. M. Wolf (alt.)*
U. S. Navy Department, *Officer-in-charge, Specification Section, Design Division, Bureau of Engineering; Officer-in-charge, Design Section, Bureau of Ordnance*
U. S. War Department, *Captain S. L. Conner*

have been prepared to insure uniformity in the data collected.

Parallel with the field survey, an experimental study is being made at Battelle Memorial Institute, Columbus, Ohio. It will cover not less than one each of the six various types and sizes of boilers, with each of the four types of coal, or a total of 24 installations selected as representative of both good and bad performance from the data obtained in the field survey. This investigation is estimated to cost $6,000 and was expected to be completed by June, 1939.—*American Society of Mechanical Engineers.*

Drawings and Drafting Room Practice (Z14)—No suggestions for a revision of this standard have been received.—*American Society of Mechanical Engineers; Society for the Promotion of Engineering Education.*

Committee on Grounding Hears Report on Research

EIGHTEEN investigations to determine the effect of grounding electrical wiring on pipes within buildings have been made during the past year since the committee's last report, a Technical Subcommittee told the American Research Committee on Grounding at its meeting June 23. Results of some of these investigations were reported by the subcommittee at that meeting.

"In the investigations to date the committee has found various unsafe and unsatisfactory conditions in electric wiring, water pipes, gas pipes, etc.," the subcommittee's summary of its findings said. "Many of these were in violation of established good practice. However, to date the committee has been unable to find any case where electrical grounding was shown to be a material factor in causing damage to water pipes or their contents."

The American Research Committee on Grounding, which was organized as the result of questions raised in the American Standards Association on the effect of electrical current flowing through water, gas, or drainage pipes used for grounding, has a membership of 14 national organizations concerned with the problem of grounding electric light and power circuits. Its work is expected to show whether present provisions of the National Electrical Code on grounding should or should not be revised.

The technical subcommittee of the Committee on Grounding carries on laboratory investigations as well as investigations of conditions in the field. It has spent considerable time and effort investigating individual cases where difficulty with either pipes or their contents might have been attributed to the effects of stray alternating current on the pipes as a result of electrical grounding, its report shows.

The committee is planning additional tests on pipes carrying alternating and direct current, with the conditions of the tests carefully controlled so as to eliminate, as far as possible, experimental error. It expects to determine from these tests any effects on the water samples obtained from the pipes by taste and odor rating, and by spectrographic or chemical methods of analysis. Any effects on the pipes will also be observed.

The committee is also anxious to obtain additional field cases where it is believed that electrical grounding might have some effect on corrosion of piping, impairment of water, sparking, or electric shock, in order that its field investigations will cover the full range of field conditions.

British Drafts Available From ASA Office

A draft British Standard for Refuse Storage Containers and a draft revision of British Standard specifications for railway rolling stock material and for solid rolled steel railway wheels and disc wheel centers are now available from the American Standards Association. The draft for refuse storage containers is number CF(CH)2140.

The draft revision for railway rolling stock material is numbered CF (ME) 3199, and that for solid rolled steel railway wheels and disc wheel centers is numbered CF (ME) 3198.

The American Standards Association will be glad to forward any comments on these draft standards to the British Standards Institution. Comments on the containers should be received by the ASA by October 1; those on railway material and wheels by December 15.

ASA Committee Starts Broad Program To Coordinate Building Sizes

Two new subcommittees will prepare sample coordination—of masonry made from structural clay products, and of doors and windows—for study by ASA committee

Members present at committee meeting expect lower building costs as result of committee's work

ON JULY 13, a new committee of the American Standards Association started work on the coordination of dimensions of building materials and equipment.

This is not the first effort in this line. Many attempts have been made to coordinate sizes of particular items; for example, various types of masonry units are standardized in sizes that will coordinate the back-up with the facing materials. Some work has been done in the coordination of sizes of metal casement windows with masonry units. There are other scattered instances of standards that are correlated with the usual dimensions of the structure; for example, medicine cabinets are available in widths that fit between studs spaced 16 in. apart.

This is the first time, however, that a cooperative, industry-wide approach has been made to the problem of coordinating all dimensions of building materials and equipment.

Thirty-six industrial and technical organizations and government groups interested in building materials or housing hold membership on the committee, and more organizations may be invited to participate as the work develops.

The work grew out of a request to the American Standards Association on the part of Bemis Industries, Inc. (now succeeded by the Modular Service Association), which was endorsed by an industry-wide conference in September, 1938. The American Institute of Architects and the Producers' Council, Inc. are taking the leadership in the technical part of the work.

Other Advantages

In addition to the major objective of economies in field erection, the groups concerned hope to derive other particular advantages from the committee's work, including the following four points of especial significance, M. W. Adams, of the Modular Service Association, secretary of the committee, told the meeting on July 13.

First: Standardization of certain materials and accessories would increase their availability and would simplify the work of the architect in specifying them.

Second: Standard sizes would result in the use of modern machinery methods in the manufacture of some of the items, with a pronounced improvement in the quality and precision of the finished product.

Third: Many groups are already faced with urgent problems of size standardization which they believe this work will help to solve. For example, it would eliminate many of the sizes that now overlap or for which there is no practical necessity.

Fourth: A few groups have developed new materials or new uses for existing materials. In many cases the commercial success of these materials is dependent on the possibility of using them in ranges of exact predetermined sizes.

A fifth reason for the work was given by the representative of one group who felt that the manufacture of his product in standard sizes, instead of on a custom basis, would result in distinct improvement in the physical properties of the product.

Those at the meeting did not minimize the difficulties to be met in this work of coordinating and standardizing building supplies. It was pointed out that municipal laws regarding heights of buildings, requirements for set-backs, and other regulations of this type set certain limits that will

have to be taken into consideration in the development of standards.

Notwithstanding the difficulties, the committee hopes in time to set up a rational basis of dimensional coordination that will properly coordinate sizes and dimensions of building materials.

Most builders agree that the type of individual standardization of parts which has been going on must be correlated in some way before further appreciable progress will be possible, the discussion showed. The committee, through its present work, hopes to provide for direct interfitting between standardized items. This will give the manufacturer a means of simplifying his practice, reducing his variety of parts, and standardizing his assemblies. It will give the builder a means of reducing his cost of erection, while the architect will benefit from the ease with which he can specify stock sizes that will fit exactly the dimensions of his plan.

Material Not In Use

One member of the committee pointed out that under present conditions there are materials of merit that are excluded from use in housing because they cannot be readily cut to size in the field, and the individual detailing and manufacture that is necessary for their use make their cost prohibitive. This is well illustrated by the Clairton Colonial Village project, located near Pittsburgh and completed in 1938. The steel stairs bought in quantities for these houses cost $22 per flight in contrast with the estimate made by the manufacturer of $75 for one individual flight of stairs.

Another member said that through the application of dimensional correlation, his company has found marked economies in design and better control of operations in building construction which have led to more uniform manufacturing practices and lower erection costs in the field. His company's experience showed that the principles which the committee now has under consideration have simplified many of the checking problems that architects, manufacturers, and contractors had faced, and resulted in a net saving of approximately 10 per cent. His company's greatest problem has been to obtain building materials whose dimensions could be coordinated with their present practices, he said.

The Department of Housing in Canada has applied standardization principles in its own architectural drafting work but has found that few materials fitted in with the system, another member told the committee. Some savings were effected in the drafting, but far greater savings should be possible in the construction part of the work, he said.

The new ASA committee's most difficult task will be correlating the activities of the several subcommittees which will have to be organized to handle specific technical problems, such as, for example, the standardization of units and details of concrete block masonry, or the coordination of window and door openings with masonry walls.

The first two subcommittees were authorized on July 13. They will study the work to be done and prepare sample applications of coordination to demonstrate how the committee's program can be carried out. One of these subcommittees will work on masonry made from structural clay products and will be under the chairmanship of H. C. Plummer of the Structural Clay Products Institute. S. O. Hall of the National Door Manufacturers Association is chairman of the other subcommittee which will study the coordination of wood windows and doors. When these two subcommittees have completed sample applications of coordination in their own fields, the sample prepared by the one will be correlated with that of the other in order that the general committee can study the methods to be followed and the problems which arise in the coordination process. Organization of other subcommittees will probably not take place until some idea of the difficulties and problems which may be expected are obtained from the demonstrations prepared by these two subcommittees.

Subcommittees to Be Small

The plan is to keep membership of subcommittees to a minimum, thus assuring units small enough to do effective work. To formulate and supervise the committee's program, and to correlate the work under consideration or being developed by the subcommittees, a small executive committee was set up:

M. H. Foley, Voorhees, Walker, Foley & Smith
J. H. Matson, General Electric Company
M. W. Adams, Modular Service Association
R. L. Bertin, White Construction Company
T. I. Coe, American Institute of Architects
J. W. Follin, Producers Council, Inc.
Frederick Heath, Jr., Colonial Clays, Inc.
V. B. Phelan, National Bureau of Standards
A. C. Shire, United States Housing Authority

Through the work of this new ASA committee, the building industries are seeking a basis of coordination that will include all the material, accessories, and equipment used in building. It must not be assumed from this, however, that other sizes will cease to be available. The coordinated standards will merely provide a group of sizes suitable and adequate for practical requirements. Their use will depend entirely upon the extent to which they can contribute to lower cost of building.

How Federal Government Agencies Carry Out Standardization Activities

Part 2
The War and Navy Departments

by

John H. Courtney

Washington representative, American Standards Association

Standardization activities of the National Bureau of Standards (including the Division of Simplified Practice, the Division of Trade Standards, and the Division of Codes and Specifications), and the Federal Specifications Executive Committee were described in the July issue of INDUSTRIAL STANDARDIZATION

An installment about the work of other agencies will be published soon

War Department

IN a recent article[1] the Assistant Secretary of War discussed the standardization policy which is in effect in all branches of the Army today and the part to be played by standards in preparation for an emergency. In this article, we will now describe the procedure by which standard items are selected and developed in the War Department and by which procurement specifications are prepared for these items.

Each of the seven major supply branches of the Army—Ordnance Department, Chemical Warfare Service, Quartermaster, Engineer, Signal, Air, and Medical Corps—engages in standardization activities relating to its particular field. While the details of the development of the standards may vary somewhat for the different supply services, the general procedure is essentially the same whether the item under consideration is a field gun, a field range, a gas mask, or a first-aid kit. All these activities have the same common objective, namely, the development of a standard for every important item of military supply—a standard adapted to large-scale quantity production, which when reflected in a carefully drawn specification will facilitate the rapid procurement of supplies in quantity to meet any emergency.

In general, the development of a standard item of equipment customarily proceeds in four stages. It begins with a request, generally by a using arm or service, for a certain item of equipment or for a modification of an existing item. A statement of required military characteristics is drawn up and coordinated by the using arm and the supply service is then charged with the development of the item. Such a statement for an automatic

[1] See INDUSTRIAL STANDARDIZATION, March, 1939, pp 52-57.

rifle, for example, might specify a certain degree of durability, a maximum weight, a limit on recoil, a minimum rate of fire, and a cost limit. This statement is reviewed by the General Staff, and upon approval a project is authorized.

The second stage consists of the design and experimental testing of a model or a series of models of the proposed item. This phase of the development of the standard is under the supervision of the technical staff of the supply service, although the using arm participates in the test. Considerable time may be required to experiment with the various models. The Garand rifle is reported to have required thirteen years for this stage, and a new type of field range has been under development since the end of the World War.

If the experimental tests are satisfactory, the item enters the third stage, which includes procurement of a limited quantity of the item and extended service tests by the using arm over a period of perhaps a year or more, although this stage may be omitted at the discretion of the Assistant Secretary of War. The new slate-blue uniforms, for example, are undergoing this service test at present. If the service tests prove the item to be suitable for tactical requirements, it is recommended for standardization by the using arm and procuring branch, approved for procurement by the Assistant Secretary of War, approved as standard by the General Staff, and the approval is recorded in the Book of Standards under one of the appropriate classifications, of standard, substitute standard, or limited standard.

The final stage, the preparation of specifications for production of the item, is under the supervision of the Assistant Secretary of War. The specifications are prepared by the service which designed the item and must adhere to the military characteristics approved in the first stage of development of the standard. They must contain a clear and accurate description of the item for which the specification is drawn and of the process of inspection by which compliance is checked. They must also conform so far as practicable to standard commercial practice. Before being submitted for clearance the specification must be coordinated with other interested arms and services of the Department.

Specifications are cleared through the Standards Division of the Office of The Assistant Secretary of War. Here the specification is checked for compliance with the procedure established for the development of standards, to determine whether (1) the item has been properly approved as standard; (2) the form, numbering and arrangement of the specification is correct; (3) the specification has been coordinated with other interested arms and services; (4) it is acceptable to industry; and (5) it contains restrictive features that might curtail production. If the specification meets this test, it is cleared by the Standards Division and becomes a U. S. Army Specification.

How It Is Done

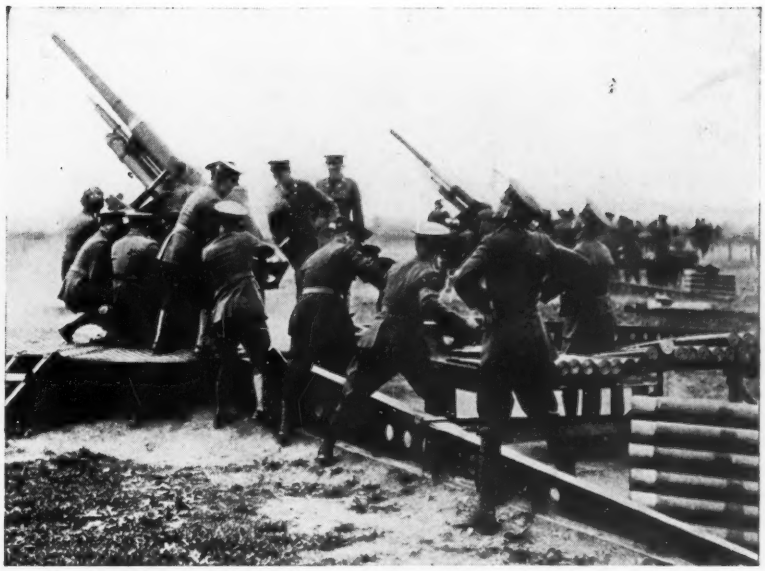
A specific example will illustrate the application of the above procedure in preparing and coordinating Army specifications.

Artillery cannon and carriages are important items of equipment for the Army and are procured by the Ordnance Department through its arsenals. Recent advances in the art of welding have made possible the elimination of many intricate castings and much riveting in the construction of artillery carriages. It was therefore necessary for the Ordnance Department to procure steels having the necessary physical characteristics required for these carriages and which were also best adapted to welding processes. The Ordnance Department, therefore, undertook the preparation of a specification to cover the steel which had been found suitable for the purpose. The particular types desired were plain carbon and low alloy (high tensile) steel for welded structures. A tentative specification covering these steels was prepared at one arsenal and coordinated with the other interested arsenals. This coordination took into consideration the long experience these arsenals had in the procurement of steel. The specification was further considered and approved by an Advisory Board consisting of metallurgists of the Ordnance Department and of the industry. The final draft was then used by these arsenals in the procurement of large quantities of plate for welding over a period of several months.

As a result, the specification was considered suitable for use by all War Department procuring agencies. It was, therefore, submitted to the other interested procuring agencies of the War Department for comment or concurrence. The specification thus prepared, examined by industry, tested by actual procurement, and concurred in by all interested supply arms and services of the War Department was then approved by the Office of The Assistant Secretary of War as a U. S. Army Specification for use in the procurement of War Department requirements for this material.

Issue Annual Index

An index of United States Army and Federal specifications used by the War Department is published annually. The current list covers about 3700 standard artieles of equipment and supply. Some 3900 U. S. Army specifications have been developed to date and it is estimated that about 1900 additional Army specifications will be



Official Photo, Ordnance Dept., U. S. Army

Three-inch antiaircraft guns

The Army procedure by which standards for steel used in artillery cannon and carriages are developed is described on page 212

needed, together with the Federal specifications to complete the standardization program covering some 7300 principal items.

In order that Army standards may conform as nearly as practicable to commercial standards the War Department maintains close contact with commercial standardization and cooperates actively with other organizations engaged in standardization. Among these are the Commercial Standardization Group of the National Bureau of Standards with which the War Department works closely, and the Federal Specifications Executive Committee of which it is a member in addition to having representation on a majority of the technical committees. Through membership in the American Standards Association the War Department keeps in close touch with industrial standardization, and through its representation on some 36 technical committees of that organization the Department cooperates actively and effectively in the development of many projects having particular application to the present program of preparedness.

Navy Department

More so perhaps than any other Federal department, the Navy has for many years advocated and practiced standardization, due undoubtedly to some extent to the unusual character of its activities. Operating as it does, usually at considerable distances from sources of supply available to land forces, the ease of replacing worn out or damaged parts from material in stock is a matter of great importance to the Navy. And the fact that such spare parts must be stocked either on board ship or at shore supply depots has made it necessary for the Navy to keep to a minimum the number of such replacement parts. Standardization has provided a practical solution to both these problems.

Standardization of equipment and material implies the use of standard specifications in the procurement of such items, and in this practice the Navy has been a pioneer among Government departments. Standard specifications have not only assured the Navy that the materials purchased will be those which experience has demonstrated to be most effective and economical, but they have proved of advantage in another direction. By enabling more manufacturers to bid on Navy contracts not only have the benefits of greater competition been obtained, but of even greater importance has been the fact that additional sources of supply have been made available for items which are consumed rapidly in time of war. So thoroughly, in fact, has the value of standard specifications been demonstrated in Navy purchasing that their use has been made obligatory throughout the Department. When available, Federal specifications are used in all cases except where for administrative reasons their use is not practicable. Where no Federal specification exists a Navy specification is used.

The development of a standard Navy specification is not a complicated process. Considerable care is exercised in the preparation of Navy specifications, however, to insure that material purchased under the specification not only will be best fitted for its purpose, but will also conform

so far as practicable to commercial practice. An attempt is made to keep a reasonable balance between what is required and what can be furnished in order to obtain quality in line with Navy requirements and yet not set the standard so high as to make the item "special" and therefore unduly expensive. To that end, the Navy Department cooperates actively in the preparation of its specifications with national standards-making bodies, technical societies, and commercial groups.

How Standards Are Developed

To illustrate the methods employed in developing a Navy specification, assume that a specification for a certain item is needed in one of the bureaus. After consultation with informed commercial manufacturers and representatives of other Government agencies having information in regard to the item, a tentative specification is prepared by the interested bureau and considered by all concerned in that bureau. If satisfactory, the specification drawn up in Navy Department specification form is circulated to manufacturers for comment, after which it is transmitted to the Bureau of Supplies and Accounts via all bureaus which may also be interested in the particular item.

The bureau of origin determines which bureaus have an interest in the proposed specification and so indicates on the letter of transmittal. The specification is examined in each of these bureaus and if satisfactory the bureau endorsement is noted and the specification is forwarded to the next bureau. In case any interested bureau does not approve the specification, comments and criticisms are attached and the specification is forwarded recommending consideration. After all interested bureaus have examined the specification it is sent to the Bureau of Supplies and Accounts.

Unless all interested bureaus have approved the specification, it is returned by the Bureau of Supplies and Accounts to the bureau of origin. The bureau of origin confers with the bureaus which have withheld approval, redrafts the specification, if necessary, to meet objections, and again forwards it to the Bureau of Supplies and Accounts as before, via all interested bureaus. This procedure is repeated until all bureaus are in agreement on the specification. When the revised specification is finally approved, it is accepted by the Bureau of Supplies and Accounts, checked for form and arrangement, and printed as a Navy specification.

The bureau of origin becomes the sponsor for the specification and is responsible for all revisions, requests from other bureaus for revisions being made to the sponsor bureau. When an existing Navy specification is revised it follows the same procedure as a proposed specification and is not put into effect until all interested bureaus have indicated their approval.

Control over the progress of specifications through the various bureaus is maintained by a Navy Department Specification Board consisting of representatives from each bureau of the Department. Meetings of this board are held at monthly intervals, at which time reports are required on all specifications in progress with explanations of any delay in transmittal.

An index of Navy and Federal specifications used by the Navy Department for naval stores and materials is issued semiannually. The items covered are listed alphabetically, together with the number or symbol of the specification, the date of issue, and the bureaus interested in the particular specification. The current index lists some 2200 specifications, of which about 900 are Federal specifications or conform to Federal specifications. As previously stated, the use of a Navy specification in preference to a Federal specification is sometimes found advisable for administrative reasons. For example, a Navy specification for a given material may have become so thoroughly established through long use that for items made from this material, the specification number is sufficient to identify on drawings the quality of material desired. Substitution of the corresponding Federal specification is not usually considered advisable in such cases because of the numerous changes in drawings which would be involved.

Only One Phase of Program

The above discussion has dealt only with one phase of the Navy's standardization program. A more thorough discussion would take into account the planning procedure employed in the several bureaus and the inspection service necessary to insure that materials and equipment will conform to purchase specifications. These subjects require special consideration, however, beyond the scope of the present article. Outside its own special field, moreover, the Navy cooperates actively in the standardization work of national and Federal organizations. To illustrate, mention may be made of the Navy's effective participation in the work of the American Society for Testing Materials, the Federal Specifications Executive Committee, and the American Standards Association. The Navy has official representation from three bureaus on the latter organization and is represented on many of the technical committees. Standards approved by the ASA find extensive use in Navy practice.

ASA Approves Revision Of Radio Standards

Commercial definitions, dimensional standards on cord tips, binding posts, cable terminals, plugs and jacks, panel lamps, and bases are included in the revised Manufacturing Standards Applying to Broadcast Receivers (C16.3-1939) approved recently by the American Standards Association. The revised standard also includes a color code for resistors and dimensional and operating standards for on-off switches, adjustable resistance units, and rotary circuit switches.

A second revised standard for radio equipment covers Standard Vacuum-Tube Base and Socket Dimensions (C16.2-1939).

Both standards were based on standards of the Radio Manufacturers Association and were presented to the American Standards Association by the ASA committee on Radio, which is under the technical leadership of the Institute of Radio Engineers of the American Society for Testing Materials.

Shimasuye Succeeds Mujata As Japanese Standards Secretary

N. Shimasuye has been appointed to succeed M. Mujata as technical secretary of the Japanese Engineering Standards Committee, at Tokyo, Japan. Mr. Mujata has retired from government service.

ASA Standards Activities

Each month this space will be assigned to the listing of new projects, new standards, drafts of standards submitted to the American Standards Association for approval, or drafts not yet submitted but which are now being considered by ASA committees.

Standards Approved Since Publication of Last List of Standards, February 1

(Where price is not shown, copies of standards were not available at time of publication of this issue. Orders will be received by the ASA and filled when copies become available.)

American Standard Safety Code for Mechanical Refrigeration (Revision of B9-1933) B9-1939 20¢

American Standard Specifications for Welded Wrought-Iron Pipe (Revision of B36.2-1934) B36.2-1939

American Standard Specifications for Electric Fusion-Welded Steel Pipe for High-Temperature Service (B36.11-1939)

American Standard Wrought-Iron and Wrought-Steel Pipe (Revision of B36.10-1935) B36.10-1939 50¢

American Standard Indicating Pressure and Vacuum Gages B40.1-1939 40¢

American Standard Manufacturing Standards Applying to Broadcast Receivers (Revision of C16d-1932) C16.3-1939

American Standard Vacuum Tube Base and Socket Dimensions (Revision of C16c-1932) C16.2-1939

American Standard for Malleable Iron Screwed Fittings (Revision of B16c-1927) B16c-1939 50¢

American Standard Methods of Test for Insulation Resistance of Electrical Insulating Materials (Revision of C59.3-1935) C59.3-1939

American Standard Specifications for Rubber Insulating Tape (Revision of C59.6-1938) C59.6-1939

Standards Now Being Considered by Standards Council for ASA Approval

Manual of Accident Prevention in Construction (Revision of A10-1934)

National Electrical Safety Code C2—Part 4

Regulations for the Installation of Air Conditioning, Warm Air Heating, Air Cooling and Ventilating Systems (Revision of Z33.2-1938)

Specifications for the Inspection of Motor Vehicles D7

Specifications for Red Lead (Revision of ASTM D 83-31; ASA K24-1937)

Specifications for Commercial Para Red (Revision of ASTM D 264-28; ASA K31-1937)

Specifications for Titanium Dioxide Pigments (ASTM D 476—Withdrawal of Specifications for Titanium Barium Pigment ASTM D 382-35, ASA K38-1937; Titanium Calcium Pigment ASTM D 383-35, ASA K39-1937; Titanium Dioxide ASTM D 384-36, ASA K40-1937)

Specifications for Uncoated Wrought-Iron Sheets (Revision of ASTM A 162-36; ASA C23-1937)

Specifications for Gypsum Plasters (Revision of ASTM C 28-30; ASA A49.3-1933)

Specifications for Weather-Resistant Saturants and Finishes for Rubber-Insulated Wire and Cable C8.19

Specifications for Heavy Wall Enamelled Round Copper Magnet Wire C8.20

New Projects Requested

Protection of Homes and Small Properties from Fire Hazards

Standardization of Voltages Below 100 Volts

Standardization of Identification Markings for Compressed Gas Cylinders

Safety Code for Household Ladders

Sphere Gap Standards

Drafts of Proposed Standards Available

National Electrical Code—reports of Article Committees (subcommittees) for consideration at meeting of ASA committee to be held November 20.

Surface Roughness

Reamers